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### Improvements in Locomotive Boilers.

*[Communicated from abroad by John Eastburn Wooten, of 227, South Fourth Street, Philadelphia, in the County of Philadelphia, State of Pennsylvania, and United States of America, Engineer.]*

#### COMPLETE SPECIFICATION.

I, SYDNEY PITT of Sutton in the County of Surrey Gentleman do hereby declare the nature of the invention for "IMPROVEMENTS IN LOCOMOTIVE BOILERS" and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

5 The invention more particularly relates to locomotive boilers of the class, in which a material increase of grate area and fire box heating surface is attained, relatively to the ordinary construction by the provision of a fire box which is located above and extended laterally beyond the driving wheels, and which is combined with a combustion chamber, and a fire bridge, interposed between the  
10 combustion chamber and the fire box. A full exemplification of said features may be found in Letters Patent of the United States Numbers 192,725 and 254,581 granted and issued under dates of July 3<sup>rd</sup> 1877 and March 7<sup>th</sup> 1882 respectively.

The object of the invention is to afford improved facilities for the effective and economical combustion of lignite, and other fuels (such as bituminous coals of  
15 various descriptions) which are analogous thereto in the particular of readily permitting the separation of small and light particles from the larger masses or fragments in which they are delivered for consumption, when burned under a forced blast, even though the latter may be comparatively mild in degree.

To this end my improvements generally stated, consist in a table or repository,  
20 located at the forward end of a fire box and extending transversely to the same above the level of the grate thereof, said table being adapted to receive and sustain light particles of fuel that may be lifted from the mass upon the grate by the action of the draught; also, in a table or repository located on and supported by the forward portion of the fire grate of a locomotive boiler; also, in a table or  
25 repository composed of one or a series of sections of fire brick, tile, or other sufficiently refractory material, built into the forward portion of the fire box of a locomotive boiler and supported by the grate thereof; also in the combination of a laterally extended fire box, a fire bridge, and a transverse table or repository extending rearwardly from said fire bridge across the fire box. The improvements  
30 claimed are hereinafter more fully set forth.

In the accompanying drawings: Figure 1 is a vertical, longitudinal, central section through a locomotive boiler embodying my invention; Figure 2, a horizontal, longitudinal section through the same, at the line *x, x*, of Figure 1; and Figure 3, a vertical transverse section at the line *y, y*, of Figure 1.

[Price 6d.]



*Pitt's Improvements in Locomotive Boilers.*

My improvements are herein illustrated and will be described as applied in a locomotive boiler of the class hereinbefore referred to. The waist or barrel A of the boiler is fitted with a series of fire tubes *a* extending from the smoke box A<sup>1</sup> to a combustion chamber A<sup>2</sup>, formed in the end of the waist adjacent to and communicating with the laterally extended fire box B, and a fire bridge *a*<sup>2</sup>, extends 5 across the lower portion of the combustion chamber, separating the same from the fire box. A dome A<sup>3</sup>, is placed upon the waist in any convenient position, and carries the safety valves, whistle, and other ordinary attachments.

The cab can be conveniently located about midway of the length of the boiler, or otherwise, if desired, and the smoke box A<sup>1</sup>, is provided with a stack A<sup>4</sup>, of any 10 preferred construction.

The fire box B is, in this case, located entirely above the driving wheels, and is extended laterally beyond the driving wheels to any desired extent within the greatest width admissible for passage over the road. It is, as usual, furnished with a proper grate *b*<sup>1</sup>, furnace doors *b*<sup>2</sup>, and ash pans *b*<sup>3</sup>, the latter suitably 15 arranged relatively to the engine frame and driving axles.

Under my invention, I provide a table or repository C, which may be either horizontal or inclined in or about in correspondence with the inclination of the fire grate *b*<sup>1</sup>, and which extends across the firebox B, immediately in rear of the fire bridge *a*<sup>2</sup>, above the surface of and, by preference, supported upon the forward 20 portion of the fire grate, and having its rear end closed between its top and the level of the grate. Said table or repository thus presents upon its upper side a substantially imperforate surface which is adapted to receive and sustain particles of the fuel which may, from time to time, be lifted by the action of the exhaust from the mass of fuel in combustion upon the grate, as well as to serve as the 25 lower boundary of a space within the fire box which fulfils, in a great measure the function of a combustion chamber for the gases. The tendency of such separated particles of fuel to be carried over the fire bridge, and into the combustion chamber A<sup>2</sup> and tubes, which ordinarily obtains, is, by the provision of the table C, substantially millified, and such particles, after yielding the heat due to 30 their combustible elements, remain upon the table, and may be removed therefrom at pleasure or convenience. It will be obvious that it is not designed nor desirable that fuel should be fired upon the table C, but if any portion of the fuel be accidentally projected on the table its functions will not thereby be interfered with. The height of the table above the surface of the grate should be sufficient 35 to obviate such tendency for fuel to be thrown upon it, with proper firing, and in practice its upper surface may be located at or about the ordinary level of the bed of fuel carried thereon, or a short distance above the level of the heaviest fire permitted to be maintained.

In the instance shown, the table C rests and is supported directly on the top of 40 the grate, which, for simplicity and convenience and economy of construction, I deem more desirable than supporting it separately therefrom. The latter plan may however be adopted, if preferred, it being essential, in such case that no opening should be permitted to exist at its rear end between its lower side and the top of 45 the grate.

The table C, is by preference, formed of a tile, or a series of bricks, tiles or sections of fire clay or other sufficiently refractory material, which may be built into the front end of the fire box, so as to form a continuous body therein, extending from the back of the fire bridge over a greater or less portion of the area of the grate, as regulated by the characteristics of the particular fuel employed. It has 50 been found, in practice, with engines having an area of fire box on line of grate of about 76 square feet that with some fuels, a table covering ten (10) per cent of the length of the grate is efficient, whereas, with other fuels, a table has been employed covering as much as twenty five (25) per cent of the length of the grate. It may however with certain fuels, or under certain conditions of service, be found 55 advisable to extend the table over a greater fraction of the length of the grate than that last mentioned. A table constructed and supported as before set forth is



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of comparatively slight cost, and can be readily and expeditiously inserted, repaired, or removed whenever required.

5 The application of the improvements is inexpensive, as it involves no changes in the fire box proper, and their practice, with fuels of the description hereinbefore referred to, has been characterized by entire freedom in steaming without undue labour in firing, and with a material reduction of the emission of smoke and light cinders from the stack.

10 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A table or repository located transversely to the fire box of a locomotive boiler at the front end and covering the forward portion of the grate thereof, the rear end of said table being closed from its top to the surface of the grate, and its upper surface being located above the surface of the grate at or about the ordinary level of the bed of fuel thereon, substantially as set forth.

2. A table or repository located on and supported by the forward portion of the grate of a locomotive boiler, its upper surface being located above the surface of the grate at or about the ordinary level of the bed of fuel thereon, substantially as set forth.

20 3. A table or repository constructed substantially as described, composed of one or a series of tiles, bricks or sections of refractory material built into the forward portion of the fire box of a locomotive boiler, and supported by the grate thereof, substantially as set forth.

25 4. The combination, in a locomotive boiler, of a laterally extended fire box, a fire bridge and a table or repository extending rearwardly from said fire bridge and across the fire box, substantially as and for the purpose set forth.

Dated this 1<sup>st</sup> day of January 1884.

CARPMAEL & C<sup>o</sup>.

Agents for the Applicant.

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